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SURVEY OF AIR MONITORING ACTIVITIES IN NEW YORK METROPOLITAN AREA

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SURVEY OF AIR MONITORING ACTIVITIES

IN NEW YORK METROPOLITAN AREA

Cooperative Study

U. S. Department of Health, Education, and Welfare
Public Health Service
Bureau of Disease Prevention and Environmental Control
National Center for Air Pollution Control

And

Health Research Council of the City of New York

December 1, 1967

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SURVEY OF AIR MONITORING ACTIVITIES IN NEW YORK METROPOLITAN AREA

INTRODUCTION

In cooperation with the Health Research Council of New York, the National Center for Air Pollution Control, U. S. Public Health Service, conducted a survey of agencies monitoring the air over the metropolitan New York area. This survey, which took place during the period January 9-27, 1967, included private as well as public organizations. The agencies included in this survey were: The Consolidated Edison Company of New York, the Interstate Sanitation Commission, the Long Island Lighting Company, the State of New Jersey, New York City Department of Air Pollution Control, New York University, Public Service Gas and Electric Company (New Jersey), Nassau and Westchester Counties, and the U. S. Public Health Service.

The purpose of this survey was to provide a current appraisal of air monitoring activities in the greater New York metropolitan area as of July 1, 1967. Various efforts have been made in the past to summarize such activities. This document includes all of the air monitoring activities of the various organizations operating in this area. It is a well known fact that air contaminants do not respect arbitrary political or economic boundaries. Consequently, it is imperative that each organization recognize the contaminants

arising both within and without their respective jurisdictions. It is hoped that this comprehensive survey will provide information as well as the incentive for the free exchange of data and cooperation between existing air pollution control agencies. In addition to current sampling activities, recent past, and planned future monitoring were included in the survey. In the course of the investigation, personal contact was made with the agencies involved.

POLLUTANTS MEASURED IN METROPOLITAN NEW YORK AREA

The New York community maintains a wide network of sampling stations that monitor the common air pollutants present in the ambient atmosphere. These include: suspended and settleable particulates, sulfur dioxide (SO_2), carbon monoxide (CO), oxides of nitrogen (NO_X), hydrocarbons (HC), oxidants (O_X), hydrogen sulfide (H_2S), and aldehydes (RHCO). A summary of the air monitoring activites of the various agencies measuring specific pollutants is given in Table 1.

These contaminants have been arbitrarily classified into three classes, as follows: (1) particulates, (2) sulfur compounds, and (3) other contaminants. Each of these classes is discussed below from the standpoint of physical or chemical properties and the method used for their collection.

PARTICULATES

Particulate matter classification is based on particle size and density; namely, settleable particulate, or dustfall, and suspended particulate, which is also measured as soiling index and as smoke shade.

Dustfall measurements determine the amount of heavy airborne particles that tend to settle from the air rapidly. Dustfall is measured by exposing wide-mouth containers in suitable stands on a roof or other support for 1-month exposure periods. The jars are covered after the exposure period and returned to the laboratory, where the total dustfall is determined gravimetrically. The results

Table 1. NUMBERS OF SAMPLING STATIONS AND TYPES OF CONTAMINANTS BEING MONITORED AS OF JULY 1, 1967

Agency	Particulates			Sulfur compounds			Other contaminants					Weather Stations
	Dust-fall	Suspended Part.	Smoke shade	Lead candle	SO_2 (continuous)	SO_2 (Intermittent)	CO	NO_X	Hydrocarbons	Oxidants	Aldehydes	
Consolidated Edison Company of New York	12[a]		3		9		3					
Interstate Sanitation Commission			3			1						1
Long Island Lighting Company	24[b]			15[b]								
Nassau County	14	9		14								1
New Jersey Air Sanitation Program	2	2[d]	2	2	2		2	2	2	2	2	2[c]
New York City Department of Air Pollution Control	30	5[d]	10	23	1	2	2	3	1			
New York University			1		2							1
Westchester County	9	7	2	9	2		1					1
U.S. Public Health Service (U.S.W.B.)	20	9[d]	1	50	2		2	1	1	1		4
Total	111	32	22	113	18	3	10	6	4	3	2	10

[a] Every other month in Manhattan.

[b] Estimated.

[c] Complete.

[d] Respirable Particulate.

are reported in tons per square mile per month.

Suspended particulates are collected by high-volume samplers operated by placing a tared 8- by 10-inch glass fiber filter in front of an air pump and drawing air through the filter for 24 fours at an average rate of about 50 cubic feet per minute. At the end of a 24-hour period the filters are removed and reweighed in the laboratory to determine the increase in weight due to the particulate that had been filtered from the air. The results are expressed in micrograms per cubic meter of air sampled.

Soiling particulate, or smoke shade, is collected by an AISI (American Iron and Steel Institute) sampler. The particulate, which can be further described as in the suspended class, is collected on a filter paper tape with the airflow set at approximately 0.25 cfm. After 2 hours of operation, the sampler automatically shifts the filter paper to a new position and continues operation. The quantity of particulate collected is determined by the difference in the amount of light that can pass through the soiled spot (1-inch in diameter) and the unexposed filter. The results, expressed as Cohs (Coefficient of haze) per 1,000 lineal feet, give an indication of the soiling properties of air.

SULFUR COMPOUNDS

Sulfur dioxide in the ambient atmosphere is measured by several different methods in the New York area. The methods used are usually separated into two classes of operation - continuous, wherein measurements are constantly recorded, and manual, wherein averaged values are determined on an integrated basis over a specified period. A brief

description of each method follows.

The continuous, conductometric method allows the air sample to be continuously admitted to an absorber, where the sulfur dioxide in the air stream is removed by a continuous-flowing liquid absorbent. The electrical conductivity of the resulting solution is continuously measured and recorded, and the readings obtained are proportional to the concentrations of sulfur dioxide in the atmosphere. The method is not specific for sulfur dioxide, since other soluble electrolyte-forming gases and solids also affect the results.

The continuous, colorimetric (West-Gaeke) instrument draws ambient air containing sulfur dioxide into an absorption column, which is later reacted with a dye to form a colored complex. The color intensity, which is directly proportional to the sulfur dioxide in the sample, is measured and recorded. This method is more specific for sulfur dioxide than the conductometric method, although it, too, is subject to interfering substances.

The manual-colorimetric (West-Gaeke) method is basically the same as that described above. The air sample is bubbled through an absorbing solution, which complexes the sulfur dioxide. In the laboratory, the sulfur dioxide is reacted with certain reagents to form a colored solution. The intensity is then measured by a spectrophotometor, and the absorbance is converted into a concentration measurement.

Two types of samplers are used. The automatic sequential sampler collects twelve 2-hour samples over a 24-hour period, and the single-bubbler type collects one 24-hour sample.

The manual-titrimetric (hydrogen peroxide) collects an air sample in a bubbler containing a solution of hydrogen peroxide. Sulfur dioxide in the air sample is converted into sulfuric acid by the solution, and the acid is later determined by titration with a standard base in the laboratory.

The sulfation "candle" (lead peroxide candle method) basically consists of a cylinder wrapped with a gauze coated with lead peroxide. Sulfur dioxide and certain other sulfur compounds in the air react with the lead dioxide to yield lead sulfate. The candles are exposed in an appropriate shelter for a period of 1 month and then analyzed for sulfate. Results are usually expressed in milligrams of sulfur trioxide per 100 square centimeters per day.

OTHER CONTAMINANTS

Aldehydes, carbon monoxide, hydrocarbons, oxidants, and nitrogen oxides have been grouped together since they are not monitored as extensively as the particulate or sulfur compounds.

Carbon monoxide is determined by use of an infrared continuous analyzer. The principle of detection is based on the absorption of infrared radiation by carbon monoxide. The air sample passes into a sample cell, which is subjected to infrared radiation. The carbon monoxide in the air sample absorbs some of this radiant energy. The degree of absorbance is measured and recorded. The decrease in radiant energy is directly proportional to the carbon monoxide concentration in the sample and is reported in parts per million.

Oxides of nitrogen, as used in air pollution terminology, are composed of nitric oxide and nitrogen dioxide. Nitrogen dioxide forms a magenta color when reacted with Saltzman's reagent. Nitric oxide, on the other hand, does not. Nitric oxide must first be oxidized to nitrogen dioxide by contact with an acidified potassium permanganate solution before it reacts with Saltzman's reagent. In the usual operating mode, the air sample containing oxides of nitrogen is allowed to first contact Saltzman's reagent. The developed color solution is transferred to a cell, where the intensity is measured to establish the nitrogen dioxide concentration. The effluent air from the contact column still containing nitric oxide is bubbled through an acidified potassium permanganate solution and oxidized to nitrogen dioxide, which in turn is reacted with Saltzman's reagent. The resulting colored solution flows to another cell, and the intensity is measured and recorded as the nitric oxide concentration. Another mode of operation is to oxidize the air stream by contact with potassium permanganate and determine both nitric oxide and nitrogen dioxide collectively. The concentration reading now takes the form of total oxides of nitrogen (NO_X).

Hydrocarbons are measured by an instrument that incorporates a flame ionization detector. The air sample is introduced into a hydrogen-air flame. In this flame, the hydrocarbon molecules are ionized in the intense heat. The ions are collected at the electrodes, and the resulting current is measured. The current is proportional to the number of carbon atoms present, and results are given as total hydrocarbon in parts per million as methane.

Oxidants are determined by reacting a continuous ambient air stream with a neutral 10 percent solution of potassium iodide solution. Free iodine is produced proportionally to the amount of oxidant in the air sample. The color of the liberated iodine is measured by a ratio colorimeter and recorded. This procedure records the presence of any substance capable of oxidizing iodide in the solution, such as ozone, the peroxyacetyl nitrates, and other oxidizing compounds. Sulfur dioxide produces a negative interference, but can be removed by use of a selective prefilter.

Aldehydes are measured by both continuous and manual methods. The continuous method allows the ambient air sample to react with a dye solution (modified Schiff) in a contact column. The resulting colored solution is transferred to a colorimeter cell, which measures the absorbance of the color and records it. The manual method uses sodium bisulfite as the collection solution. Aldehydes in the air sample form addition compounds with the bisulfite. The excess bisulfite is destroyed with iodine solution. When the pH of the solution is adjusted, the addition compounds decompose and bisulfite ion equivalent to the aldehydes present in the sample is set free. The liberated bisulfite ion is then titrated with standard iodine.

WEATHER STATIONS

Meteorological data give information on the movement or stability and properties of air masses. Wind direction and wind speed are the most frequently obtained weather data. These parameters are probably the most useful in describing the transport and diffusion of air contaminants.

The equipment used to obtain these two parameters is relatively inexpensive and easy to operate. Other data such as barometric pressure, relative humidity, solar radiation, and temperature are also obtained in some weather stations. The weather data reported from the La Guardia, Newark, Teterboro, and Westchester County Airports were obtained through the courtesy of the U. S. Weather Bureau.

SURVEY

A description of the monitoring activities of each participating agency that was in operation July 1, 1967, is presented. The station locations and analysis techniques used to determine the various air contaminants by these agencies are given in appropriate tables. A number of these stations are operated on a cooperative basis by two different agencies; consequently, information about these stations is repeated in some of the tables. The name of the person contacted at each agency is also noted.

CONSOLIDATED EDISON COMPANY OF NEW YORK

Mr. I. B. Dick, Chief Chemical Engineer
4 Irving Place
New York, New York

Present Activities

The Consolidated Edison Company of New York maintains nine continuous monitoring stations in New York City. There are three each in Manhattan and Queens, and one in each of the other boroughs. The location of these stations with the corresponding analysis and techniques are indicated in Table 2. Davis continuous SO_2 analyzers are located at each of these sites; three of the sites have carbon monoxide monitors and tape samplers. All of these instruments operate 24 hours a day, 7 days a week. The sampling probes are generally located about 30 feet above ground. The stations are serviced and calibrated with standard gases on a regular basis.

Meteorological data are obtained from the U. S. Weather Bureau.

Table 2. AIR MONITORING STATIONS

CONSOLIDATED EDISON COMPANY OF NEW YORK

Location	Analysis	Technique
4 Irving Place Manhattan, New York	SO_2 CO^2 Smoke shade	Conductivity (Davis) IR (Beckman) Tape sampler (Gelman)
32 West 125 Street Manhattan, New York	SO_2 CO^2 Smoke shade	Conductivity (Davis) IR (Beckman) Tape sampler (Gelman)
128 West End Avenue Brooklyn, New York	SO_2	Conductivity (Davis)
1610 Matthews Avenue Bronx, New York	SO_2	Conductivity (Davis)
Astoria Generating Station Queens, New York	SO_2	Conductivity (Davis)
41-82 Main Street Queens, New York	SO_2 CO^2 Smoke shade	Conductivity (Davis) IR (Beckman) Tape sampler (Gelman)
90-22 161 Street Queens, New York	SO_2	Conductivity (Davis)
1610 Pitkin Avenue Brooklyn, New York	SO_2	Conductivity (Davis)
Arthur Kill Generating Station Staten Island, New York	SO_2	Conductivity (Davis)

The results of the SO_2 monitoring are reported every month as daily averages, hourly averages, and daily maximum SO_2 concentration. Two of the SO_2 monitors are located at electrical power generating stations, and the data from these locations are not reported with the other seven sampling sites.

Dustfall collections of 1-month duration are made every other month at about a dozen sites in Manhattan. The total dustfall is reported in units of tons per square miles per month. Microscopic examination is made on the collected dust to determine the nature and distribution of the various compounds.

INTERSTATE SANITATION COMMISSION

Mr. George T. Cowherd, Air Pollution Activities Co-ordinator
10 Columbus Circle
New York, New York

Present Activities

At the present time, the Interstate Sanitation Commission has one SO_2 monitor and three particulate tape samplers in operation. The SO_2 sampler is of the Wilson sequential type; it operates 5 days a week and yields hourly averages of SO_2 concentrations on a 24-hour basis. This procedure analyzes for SO_2 by the hydrogen peroxide titrimetric procedure. This unit and one of the tape samplers are located at ground level at the Sewage Treatment Plant of the Willowbrook State School on Staten Island. The other two tape samplers are located in Rahway, New Jersey, at the Rahway Sewage Treatment Plant and at the Commission Offices at 10 Columbus Circle in Manhattan. The tape samplers have been in operation since September 1964. A unit for recording wind speed and direction is located

in Linden, New Jersey, at the Linden-Roselle Sewage Treatment Plant. Monitoring for sulfur dioxide has been going on since August of 1963. Present air monitoring activities and locations are given in Table 3.

Table 3. PRESENT AIR MONITORING STATIONS

INTERSTATE SANITATION COMMISSION

Location	Analysis	Technique
2760 Victory Blvd. Staten Island, New York	SO_2 Smoke shade	Titrimetric (Wilson, Seq.) Tape sampler (RAC)
Rahway Sewage Treatment Plant Rahway, New Jersey	Smoke shade Wind speed Wind direction	Tape sampler (RAC)
10 Columbus Circle Manhattan, New York	Smoke shade	Tape sampler (RAC)

Past Activities

Although there is presently only one SO_2 monitoring station, there were a total of eight (see Table 4 for locations) until May 1964.

Table 4. PAST AIR MONITORING STATIONS

OF INTERSTATE SANITATION COMMISSION

Location of SO_2 monitoring stations operating until May 1964 (Wilson sequential samplers)

New Jersey:	Staten Island:
Sewage Treatment Plant Elizabeth, New Jersey	169 Arthur Kill Road Staten Island, New York
Linden-Roselle Sewage Treatment Plant So. Wood Avenue Linden, New Jersey	Travis, Staten Island, New York
Carteret Sewage Treatment Plant Carteret, New Jersey	2760 Victory Blvd. Staten Island, New York

LONG ISLAND LIGHTING COMPANY

Mr. Bernard Kelly, Director of Air Pollution Activities
Long Island Lighting Company
Old Country Road
Hicksville, New York

Present Activities

A sampling program was initiated in 1964 to measure the sulfation rate with lead peroxide candles. The current network consist of 41 dustfall stations and 27 sulfation candles mounted on telephone poles in the vicinity of the five electric power generating stations. Since January 1966, the preparation, collection, and analysis of both the dustfall jars and lead candles have been conducted according to procedures supplied by New York State.

Settleable solids from the dustfall jars are reported in units of milligrams per square centimeter per month and tons per square mile per month. The solids are further divided into volatile and nonvolatile. The results from lead candles are reported as milligrams of SO_3 per 100 square centimeter per day. The location of the stations operating in Nassau County are given in Table 5.

Table 5. AIR MONITORING STATIONS

LONG ISLAND LIGHTING COMPANY
(NASSAU COUNTY ONLY)

Location	Analysis	Technique
Glenwood Generating Station (Approx. 1 mile north of Roslyn)	Sulfation Dustfall	Lead candle Bucket
Generating Station, Far Rockaway	Sulfation Dustfall	Lead candle Bucket
Barret Generating Station, Island Park	Sulfation Dustfall	Lead candle Bucket

NOTE: There are approximately eight dustfall buckets and five lead candles in the vicinity of each generating station.

Long Island Lighting issues monthly reports on the results obtained from their monitoring stations. These data are sent to the Division of Air Pollution Control, New York State Department of Health for incorporation into their reports.

Past Activities

During the period 1955-1960, dustfall concentrations were measured in the vicinities of the various power generating stations in Nassau and Suffolk Counties.

Future Plans

A system of about 10 sequential samplers for the monitoring of SO_2 is to be placed in operation this summer. The analytical technique used will be the West-Gaeke method with the actual analysis being performed automatically by a Technicon unit at the central laboratory.

NASSAU COUNTY

Mr. Robert D. Cusumano, Director of Air Pollution Activities
Nassau County Department of Health
Old Country Road
Mineola, New York

Nassau County presently has a system of 14 dustfall buckets, 14 lead candles, and 9 high-volume air samplers. There are also 4 lead candles and an effects package operated as a courtesy for the U. S. Public Health Service, and 1 high-volume air sampler operated for New York State. Two stations gather meteorological data. The various stations (excluding the ones in Suffolk County) are indicated in Table 6.

Table 6. AIR MONITORING STATIONS

NASSAU COUNTY

Location	Analysis	Technique
Elmont (Department of Cancer Detection Center)	Dustfall Sulfation	Bucket Lead candle
Freeport Fire Department	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Glen Cove (Department of Public Works Bldg.)	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Inwood Country Club	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Kings Point (U. S. Merchant Marine Academy)	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Massapequa Fire Department Engine Co. No. 3	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Mineola County Office Bldg.	Dustfall Sulfation Particulate Weather data	Bucket Lead candle High-volume air sampler
New Cassel (Westbury Water District)	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Oceanside Sewage Pumping Station	Dustfall Sulfation	Bucket Lead candle
Oyster Bay Town Hall	Dustfall Sulfation	Bucket Lead candle
Plainview (Nassau County Sanatorium)	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Rockville Centre	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Roslyn Water District	Dustfall Sulfation	Bucket Lead candle
Tobay Beach	Dustfall Sulfation	Bucket Lead candle

The accumulated data are processed by New York State, although Nassau County has a computer that can be used for this purpose.

Future Plans

Two small trailers with equipment for continuously measuring SO_2, CO, HC, and smoke shade (soiling particulate) and a larger unit equipped to monitor for SO_2, CO_2, CO, NO_2, H_2S, O_X, HC, and smoke shade will be procured for future monitoring activities.

STATE OF NEW JERSEY

Mr. William Munroe, Director of Air Sanitation Program
New Jersey State Department of Health
Trenton, New Jersey

Present Activities

As one facet in New Jersey's air monitoring program, three continuous monitoring stations have been established. They are located in downtown Newark, in Bayonne (Hudson County Park), and in Ancora, a rural site in southern New Jersey. Each of these stations is equipped to continuously monitor SO_2, NO and NO_2, HCHO, and O_X with Technicon auto-analyzers utilizing standard analytical methods.

The sulfur dioxide concentration is determined by the West-Gaeke method; the oxides of nitrogen, by the Saltzman method. The oxidant concentration is measured using the potassium iodide (KI) method of analysis, and the aldehyde concentration is monitored with a Davis continuous analyzer. The carbon monoxide concentration is determined with a Beckman continuous infrared analyzer. Also present at each site is a Research Appliance (AISI) tape sampler, a high-volume air sampler, a lead peroxide candle, and meteorological equipment to measure wind speed and direction, temperature, relative humidity, barometric pressure, and solar radiation.

The stations are visited 5 days a week, but measurements with the continuous instruments are made on a 7-day-a-week basis, 24 hours a day. The Technicon instruments are calibrated once a week with appropriate standards, in addition to the internal standardization with which they are provided. The hydrocarbon and carbon monoxide units are calibrated every working day with standard gas samples.

The first station, as a prototype, was placed in operation in Newark in October 1965. It went into operation in its present form in March 1966. The station at Bayonne went into operation in July 1966, and the one at Ancora was started up in September 1966. These air monitoring activities (excluding the Ancora Station) are summarized in Table 7.

Table 7. AIR MONITORING STATIONS

NEW JERSEY AIR SANITATION PROGRAM

Location	Analysis	Technique
Raymond Blvd. & McCarter Hwy. Newark, New Jersey	SO_2	West-Gaeke (Technicon)
	SO_2	Conductivity (Davis)
	CO_2	Infrared (Beckman)
	NO and NO_2	Saltzman (Technicon)
	Sulfation	Lead candle
	Aldehydes	Schiff (Technicon)
	Oxidants	KI (Technicon)
	Hydrocarbons	Flame ionization
	Smoke shade	Tape sampler (RAC)
	Particulate	High-volume air sampler
	Wind speed Wind direction	Electric Speed Indicator Co.
	Temperature Humidity (rel.)	Hygrothermograph
	Barometric pressure	Barograph
	Dustfall	Bucket
	Respirable part.	Aerotec Respirable Sampler
	Solar radiation	
Hudson County Park Bayonne, New Jersey	SO_2	West-Gaeke (Technicon)
	Sulfation	Lead candle
	NO and NO_2	Saltzman (Technicon)
	Aldehydes	Schiff (Technicon)
	Oxidants	KI (Technicon)
	Hydrocarbons	Flame ionization (Davis)
	CO	Infrared (Beckman)
	Particulate	High-volume air sampler
	Wind speed Wind direction	Electric Speed Indicator Co.
	Temperature Humidity (rel.)	Hygrothermograph
	Barometric pressure	Barograph
	Smoke shade	Tape sampler
	Dustfall	Bucket
	Solar radiation	

The data from the continuous instruments are recorded on strip charts at the station site in the form of half-hour averages, are then placed on punch cards, and then recorded onto magnetic tape. These data are published monthly together with a statistical analysis of the results.

Future Plans

New Jersey has plans to introduce five continuous monitoring stations, which will telemeter pollutant concentrations to Trenton in a form which a computer can handle directly. These stations are to be equipped with a Davis SO_2 monitor, a Beckman CO monitor, and an AISI tape sampler. The CO and SO_2 units will report half-hour averages, and the tape sampler, 1-hour readings. Meteorological data will probably not be collected at these sites. The first of these stations is in operation at the same downtown Newark site as the previously mentioned monitoring station. New Jersey also has in existence a network of AISI tape samplers. This system has fluctuated in size, but at the present time, six units are operating. These units are located in Glassboro, Trenton, Camden, Phillipsburg, Hackensack, and Jersey City. New Jersey also does the analysis of tapes from AISI tape samplers at several locations for independent agencies. These stations are located at Livingston, Rahway, and Trenton, New Jersey, as well as on Staten Island.

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Dr. Edward F. Ferrand, Director, Bureau of Technical Services
51 Astor Place
New York, New York

Present Activities

The New York City Department of Air Pollution Control maintains a system of eight field monitoring stations in addition to the monitoring facilities at the main laboratory. At these field stations a Wilson sequential sampler is used to measure the SO_2 concentration with the hydrogen peroxide method. These instruments give 1-hour averages 24 hours a day and are operated 5 days a week. These stations are also equipped with an AISI tape sampler to measure smoke shade. Two of the field stations have Wilson sequential samplers to determine the NO_2 concentration. In addition, one station monitors only smoke shade. These stations, as well as the dustfall and lead candle sites, are listed in Table 9.

At the central laboratory a more elaborate monitoring station is maintained. In addition to monitoring continuously for SO_2 with a Davis analyzer, one sample a day is taken for SO_2 analysis by both the hydrogen peroxide and West-Gaeke method. Continuous instruments for CO and HC are also operated.

A variety of pollutants are monitored on a once-a-day basis. Aldehyde concentration is determined by the bisulfite method; NO and NO_2 are measured using the Saltzman procedure, and total oxidant concentration is measured by the KI spectrophotometric method. Also, analysis for gaseous hydrogen sulfide and ammonia monitoring has been done in the past.

Table 8. AIR MONITORING STATIONS

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Location	Analysis	Technique
51 Astor Place Manhattan, New York	CO Smoke shade SO_2 Dustfall	Infrared Tape sampler Conductivity (Davis) Bucket
Central Park (at 79th St.) Manhattan, New York	Dustfall SO_2 Sulfation Smoke shade	Bucket Titrimetric (Wilson, Seq.) Lead candle Tape sampler (RAC)
1011 Osborne Place Bronx, New York	SO_2 Smoke shade	Titrimetric (Wilson, Seq.) Tape sampler
17 Battery Place Manhattan, New York	Smoke shade Particulate SO_2 NO_2 Sulfation	Tape sampler (RAC) High-volume air sampler Titrimetric (Wilson, Seq.) Saltzman (Wilson) Lead candle
57th St. & 15th Ave. Manhattan, New York	Particulate Smoke shade	High-volume air sampler Tape sampler
10-40-47th Ave. Queens, New York	SO_2 Smoke shade Sulfation Dustfall	Titrimetric (Wilson, Seq.) Tape sampler Lead candle Bucket
445 Southern Blvd. Bronx, New York	SO_2 Smoke shade Dustfall Sulfation	Titrimetric (Wilson, Seq.) Tape sampler (RAC) Bucket Lead candle
333 Jay Street Brooklyn, New York	SO_2 Smoke shade	Titrimetric (Wilson, Seq.) Tape sampler (RAC)
57th St. & Second Ave. Manhattan, New York	NO_2 SO_2 Smoke shade Particulate Oxidants	Saltzman (Wilson, Seq.) Titrimetric (Wilson, Seq.) Tape sampler (RAC) High-volume air sampler ASTM (Wilson, Seq.)

Table 8. (Cont.) AIR MONITORING STATIONS

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Location	Analysis	Technique
170 East 121st St. Manhattan, New York	CO Dustfall SO_2 NO^2 and NO_2 Aldehydes Smoke shade Particulate Hydrocarbon	Infrared (MSA) Bucket Titrimetric (Wilson, Seq.) Saltzman (Wilson) Bisulfite Tape sampler High-volume air sampler Flame ionization
1601 80th Street Brooklyn, New York	Dustfall	Bucket
Kingsbridge Ave. & West 323nd St. Bronx, New York	Dustfall	Bucket
3750 Baychester Ave. Bornx, New York	Dustfall	Bucket
151 Maujer Street Brooklyn, New York	Dustfall	Bucket
32 East Broadway Manhattan, New York	Dustfall	Bucket
2275 Hylan Blvd. Staten Island, New York	Dustfall	Bucket
Sanitary Landfill No. 1 Staten Island, New York	Dustfall	Bucket
515 W. 102nd St. & Amsterdam Ave. Manhattan, New York	Dustfall	Bucket
Waring and Bronxwood Aves. Bronx, New York	Dustfall Sulfation	Bucket Lead candle
Logan & Edison Aves. Bronx, New York	Dustfall Sulfation	Bucket Lead candle
Union Turnpike & Queens Blvd. Queens, New York	Dustfall Sulfation	Bucket Lead candle
J.F.K. International Airport Queens, New York	Dustfall Sulfation	Bucket Lead candle

Table 8. (Cont.) AIR MONITORING STATIONS

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Location	Analysis	Technique
Beach 67th St. & Rockaway Blvd. Queens, New York	Dustfall Sulfation	Bucket Lead candle
32nd Ave. - 208th St. Queens, New York	Dustfall Sulfation	Bucket Lead candle
380 West 33rd St. Manhattan, New York	Dustfall Sulfation	Bucket Lead candle
5501 94th St. Queens, New York	Dustfall Sulfation	Bucket Lead candle
207-01 116th St. Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
250 Baltic Street Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
353 Park Place Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
Pennsylvania & Dumont Ave. Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
Bedford Avenue & Avenue H Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
3000 Avenue X (at Nostrand) Brooklyn, New York	Dustfall Sulfation	Bucket Lead candle
56 Giffords Lane Staten Island, New York	Dustfall Sulfation	Bucket Lead candle
7219 Amboy Road Staten Island, New York	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
Central Ave. & Slossen Terrace Staten Island, New York	Dustfall	Bucket

NOTE: The lead candles and high-volume air samplers are operated by the New York City Department of Air Pollution Control as a courtesy for the U. S. Public Health Service.

Particulate matter is measured with the high-volume air sampler. Some of these filters have been analyzed for beryllium; however, results thus far have been negative. A 24-hour sample is taken to determine the sulfuric acid mist concentration. Also, dust particle counts are made.

The central laboratory analyzes all the field samples by the hydrogen peroxide titrimetric method for SO_2 and the Saltzman method for NO_2. In addition to taking one sample a day for SO_2 analysis by the hydrogen peroxide method, the laboratory maintains a Davis automatic SO_2 analyzer. Carbon monoxide is measured continuously with a Mine Safety Appliance infrared instrument and is also estimated by the color development in MSA indicator tubes. The continuous instruments are calibrated regularly with the appropriate standard gases.

During the first half of 1967, five continuous monitoring instruments for measuring carbon monoxide were maintained as part of an investigation to determine the carbon monoxide levels in Manhattan. The instruments were located at the following sites:

Post Office - 45th Street and Lexington Avenue (on 45th Street)

Recruiting Station - Times Square at 43rd Street

Bell Ringing Clock Tower - Herald Square at 35th Street

Post Office - Church and Canal Streets (on Canal Street)

New York Tuberculosis and Health Association - 270 Park Avenue (between 20th and 21st Street)

Data for the various field locations are reported on a daily basis (5 days a week for the field stations). The sulfur dioxide data from nine stations are analyzed for monthly peaks and medians, and cumulative

frequency distributions have been plotted for 1955 and 1966. Data for the past 12 years of the Department's operation are on file.

The New York City Department of Air Pollution Control also maintains a network of 30 dustfall samples. At most of these dustfall sample sites lead candles are exposed on a monthly basis.

Future Plans

The New York City Department of Air Pollution Control plans to change and enlarge their present monitoring system to a 37 station network, which will include a number of telemetering stations. A list of the proposed new monitoring sites and type of stations is indicated in Table 9.

Table 9. FUTURE AEROMETRIC SYSTEM

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Type of station[a]	Site, location, and description
T	Bronx H. S. of Science 205th Street & Goulden Avenue, Bronx
M (CN)	City College, City University of New York Convent Avenue & 141st Street, Manhattan
TA (CN)	Norrisania Health Center 1309 Fulton Avenue, Bronx
M (CN)	Junior High School No. 142 Baychester & Schlieffelin Avenues, Bronx
M	Criminal Court, Part 5 1400 Williamsbridge Road, Bronx
TA (CN)	Central Park, Arsenal Bldg. 5th Avenue & 64th Street, Manhattan
M	Samuel Gompers H. S. 445 Southern Blvd., Queens
M (CN)	Bowery Bay Pollution Control Plant 41st St. & Berrian Blvd., Queens

Table 9. (Cont.) FUTURE AEROMETRIC SYSTEM

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Type of station[a]	Site, location and description
M (CN)	Tallman Island Water Treatment Plant 127th Street & East River, Queens
M (CN)	Fort Schuyler, USN MC RTC Throgs Neck, Bronx
M	Grover Cleveland H. S. Himrod Street & Grand Avenue, Queens
M	East N. Y. Vocational H. S. 1 Wells Street, Brooklyn
M	Queens Borough Hall 120-55 Queens Blvd., Queens
M	Andrew Jackson H. S. Francis Lewis Blvd. & 116th Avenue, Queens
M	Fort Hamilton H. S. Shore Road and 83rd Street, Brooklyn
M	Brooklyn College Bedford Ave. & Campus Road, Brooklyn
T	Sheepshead Bay H. S. 3000 Avenue X at Nostrand, Brooklyn
M	Tilden H. S. Tilden Ave. between 57th St. & 49th St., Brooklyn
M	Rockaway Pollution Control Project E. 106th Street & Beach Channel Drive, Queens
M	Public School No. 207 88th St. & 159th Avenue, Queens
T (CN)	Court House, City Hall Park 52 Chambers Street, Manhattan
T (CN)	Greenpoint Pollution Control Project 301 Greenpoint Avenue, Brooklyn
M	Public School No. 11 56th St. & Skillman Ave., Queens

Table 9. (Cont.) FUTURE AEROMETRIC SYSTEM

NEW YORK CITY DEPARTMENT OF AIR POLLUTION CONTROL

Type of Station	Site, location and description
M	Department of Health 34-35 Junction Blvd. (Corner 34th Road), Queens
TA	Queens College, City University of New York 65-20 Kissena Blvd., Queens
M	Bayside H. S. 32nd Avenue & Corp. Kennedy Blvd., Queens
M (CN)	Van Buren H. S. Hillside Avenue & 23rd Street, Queens
M	P. S. 371 - 4th Avenue between 36 and 37th Streets, Brooklyn
TA	Brooklyn Public Library Grand Army Plaza & Eastern Parkway, Brooklyn
M (CN)	Public School No. 40 Ralph and Marion Avenues, Brooklyn
T (CN)	Springfield Gardens H. S. Springfield Blvd. & 144th Avenue, Queens
M	Goethals Bridge Plaza Staten Island
M	Borough Hall St. George, Staten Island
M	Fresh Kills Sanitary Landfill Muldoon Avenue, Staten Island
TA (CN)	Seaview Hospital 460 Brielle Avenue, Staten Island
M	Egbert J. H. S. 2 Midland Ave. & Boundary Lane, Staten Island
M	Tottenville High School Academy St. between Amboy Rd. & Hylan Blvd., S. I.

[a]
T - Indicates a telemetering Station.
TA - Indicates a telemetering station in the alert system.
M - Indicates a manual station.
CN - Indicates a corrosion network station.

NEW YORK UNIVERSITY - SO_2 MONITORING IN GREATER NEW YORK

Prof. Ben Davidson, Project Director
2455 Sedgewick Avenue
New York, New York

Past Activities

To test a numerical model relating meteorological data with source emissions transport and diffusion, it became necessary for this group to conduct a program of monitoring the community air. The network constructed by the New York University group had, in addition to its own monitoring instruments, access to data from the New York City and Consolidated Edison Company networks. Some of the New York University stations were equipped with sequential samplers to analyze for SO_2 by the West-Gaeke method, in addition to a continuous Davis conductivity analyzer. The most reliable data were felt to come from the Davis instrument. Monitoring was carried out at six locations during the period of September 1965 to December 1966, at the end of which time the stations were dismantled. Calibration of the Davis instruments was done with known gas samples made at New York University. A study was made of the effects of CO_2 on measurement of SO_2 with the Davis instrument. This led to modifications of the instrument; Davis instruments are now regularly used by other monitoring groups.

In addition to the stationary monitors, traverses were made with mobile SO_2 monitors (Davis) by automobile and helicopter.

The stationary SO_2 monitors of the New York University project were at the following locations:

Albert Einstein Medical School, Bronx, New York
Prospect Park Tennis Club House, Brooklyn, New York

Pollack Hospital, Jersey City, New Jersey
J. F. K. Airport, Hanger 11, Queens, New York
N. Y. U. (Geophysical Science Lab.), Bronx, New York
Van Cortland Park at 411 East 239 Street, Bronx, New York

NEW YORK UNIVERSITY - AIR MONITORING AT CHRISTADORA HOUSE

Prof. William Ingram, Project Leader
1911 Osborne Place
Bronx, New York

Past Activities

This group has been involved with the operation of an air monitoring station at the Christadora House on the lower east side of Manhattan. The station operated from September 1962 until November 1966. Although the instruments were located on the 16th floor, provision was made to sample on the third, sixth, and tenth floor levels as well. These air monitoring activities are summarized in Table 10.

Table 10. PAST AIR MONITORING ACTIVITIES

NEW YORK UNIVERSITY

Analysis	Technique
Sulfur dioxide	Conductrimetric (Davis)
Sulfur dioxide	West-Gaeke (Technicon)
Nitrogen dioxide	Saltzman (Beckman)
Oxidant	Neutral KI (Beckman)
Carbon monoxide	Infrared (Beckman)
Hydrocarbons	Flame ionization (Beckman)
Sulfation	Lead candle
Smoke shade[a]	Tape sampler[a]
Particulate	High-volume air sampler
Wind direction	
Wind speed	
Temperature	
Relative humidity	
Rainfall	
Solar radiation	

[a]Smoke shade was also measured at the Jacob Riis Housing Project (approximately 1/3 mile east of Christadora House.)

Present Activities

The Christadora station is presently monitoring smoke shade and SO_2 with both a Davis and a Technicon unit. Wind speed and wind direction are also being recorded. A mobile unit is also in operation to monitor SO_2 and smoke shade during a traverse of some particular route. The instruments at the stations are maintained on a regular schedule and are calibrated using standard gases prepared by the laboratory at New York University. Also, the data from these air monitoring stations are reduced and analyzed by hand.

PUBLIC SERVICE GAS AND ELECTRIC COMPANY (NEW JERSEY)

Mr. Louis A. Winkelman, Mechanical Plant Engineer
80 Park Place
Newark, New Jersey

The Public Service Gas and Electric Company at the present time maintains a mobile air monitoring station. This mobile unit has a Davis SO_2 analyzer, a millipore filter to obtain the particulate concentration (and to examine the particulate matter with a microscope), and also a unit to measure wind speed and direction. This mobile station is operated occasionally (once or twice a month) to monitor the air around a particular generating station. In the past, about five dustfall buckets and lead candles were located in a 5-mile radius around a generating plant both before and after plant startup for several years.

U. S. PUBLIC HEALTH SERVICE

Mr. Robert T. Walsh, Chief
Raritan Depot
Metuchen, New Jersey

During the summer of 1966, the National Center for Air Pollution Control conducted an intensive investigation of the levels of sulfur

compounds and carbon monoxide in the New York - New Jersey metropolitan area. The methodology and results of this project are fully described in the publication, New York - New Jersey Air Pollution Abatement Activity, Sulfur Compounds and Carbon Monoxide, U. S. Department of Health, Education, and Welfare, Public Health Service, National Center for Air Pollution Control, Cincinnati, Ohio.

The Public Health Service is currently operating continuous monitoring stations in Staten Island, New York, and Metuchen, New Jersey. The Staten Island station, located on the grounds of the Willowbrook State School, is equipped with Beckman continuous monitoring instruments to measure oxidant, SO_2, CO, NO, and NO_2 concentrations, a high-volume air sampler, and an instrument to record wind speed and direction. Data from this station have been obtained since May 1, 1965. The second continuous monitoring station is located at the Raritan Depot in Metuchen, New Jersey. This monitoring operation is conducted with the prototype station developed by the New Jersey Air Sanitation Program. The instruments in this package consist of Davis SO_2 and hydrocarbon monitors and a Beckman CO monitor. This assembly was used during the Summer of 1966 investigation and was placed in continuous operation again on November 1, 1966.

The data from these continuous monitoring instruments are obtained as 1-hour averages and are processed by computer at the National Center for Air Pollution Control in Cincinnati.

The system of eight high-volume air samplers used in the Summer of 1966 study has been increased to a total of 20 samplers since

December 1966. A system of approximately 50 dustfall buckets is located in the metropolitan New York - New Jersey area. About 80 lead peroxide candles and 14 effects packages are also deployed in the metropolitan area. The various sampling stations are listed in Table 11. As was noted previously, some of these stations or sampling sites are operated on a cooperative basis by two different agencies.

Table 11. AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
001	2760 Victory Boulevard Staten Island, New York	CO Dustfall NO and NO_2 Oxidants Particulate Respirable Particulate SO_2 Sulfation Wind direction and Wind speed	Infrared Bucket Saltzman (Technicon KI (Technicon) High-volume air sampler Aerotec respirable sampler Conductivity (Wilson, Seq.) Lead candle Electric Speed Indicator Company
002	Chestnut St. & First St. Roselle, New Jersey	Dustfall Sulfation	Bucket Lead candle
003	Bergen Ave. & Fairview St. Fairview, New Jersey	Dustfall Sulfation	Bucket Lead candle
004	Fort Hamilton Brooklyn, New York	Sulfation	Lead candle
005	Raritan Depot Metuchen, New Jersey	CO Dustfall Hydrocarbons Particulate SO_2 Sulfation	Infrared Bucket Flame ionization High-volume air sampler Conductivity (Davis) Lead candle
006	Hudson County Park Bayonne, New Jersey	Dustfall Sulfation	Bucket Lead candle

Table 11. (Cont.) AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
007	Raymond Blvd. & McCarter Highway Newark, New Jersey	Dustfall Sulfation	Bucket Lead candle
013	Central Park at 79th St. Manhattan, New York	Sulfation	Lead candle
014	170 E. 121st St. Manhattan, New York	Sulfation	Lead candle
016	30 Church St. New Rochelle, New York	Sulfation	Lead candle
022	445 Southern Blvd. Bronx, New York	Sulfation	Lead candle
024	17 Battery Place Manhattan, New York	Sulfation	Lead candle
026	10-42 47th Ave. Queens, New York	Sulfation	Lead candle
029	101 Passaic Ave. Passaic, New Jersey	Sulfation	Lead candle
033	515 W. 182nd St. & Amsterdam Ave. Manhattan, New York	Sulfation	Lead candle
034	Waring & Bronxwood Aves. Bronx, New York	Sulfation	Lead candle
035	Logan & Edison Aves. Bronx, New York	Sulfation	Lead candle
036	Union St. & Northern Blvd. Queens, New York	Sulfation	Lead candle
037	Union Turnpike & Queens Blvd. Queens, New York	Sulfation	Lead candle
039	J. F. K. Airport-Bldg. 141 Queens, New York	Sulfation Dustfall	Lead candle Bucket

Table II. (Cont.) AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
040	Beach 67th St. & Rockaway Blvd. Queens, New York	Sulfation	Lead candle
042	Ft. Hancock Highlands, New Jersey	Sulfation	Lead candle
043	Highland Ave. & Beach Way Keansburg, New Jersey	Sulfation	Lead candle
045	Victory Bridge Plaza So. Amboy, New Jersey	Dustfall Sulfation	Bucket Lead candle
046	King George Road Fords, New Jersey	Sulfation	Lead candle
048	Stephenville Pky. & Park Ave. Edison, New Jersey	Sulfation	Lead candle
051	Rt. 22 & Myrtle Ave. Scotch Plains, New Jersey	Dustfall Sulfation	Bucket Lead candle
054	12 South Passaic St. Chatham, New Jersey	Sulfation	Lead candle
057	400 Ridgedale Ave. East Hanover, New Jersey	Dustfall Sulfation	Bucket Lead candle
060	West Essex High School North Caldwell, New Jersey	Sulfation	Lead candle
063	157 Gould Ave. Paterson, New Jersey	Sulfation	Lead candle
064	Boumar Place East Paterson, New Jersey	Dustfall Sulfation	Bucket Lead candle
066	111 Midtown Hackensack, New Jersey	Sulfation	Lead candle
068	Rt. 9W & Van Nostrand Ave. Englewood Cliff, New Jersey	Sulfation	Lead candle
069	Rye Police Headquarters Rye, New York	Sulfation	Lead candle

Table 11. (Cont.) AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
070	Glen Cove Public Works Bldg. Glen Cove, New York	Sulfation	Lead candle
090	407 Henley Ave. New Milford, New Jersey	Sulfation	Lead candle
091	111 Moonachie Road Moonachie, New Jersey	Sulfation	Lead candle
092	7400 Westside Ave. No. Bergen, New Jersey	Sulfation Dustfall	Lead candle Bucket
093	Rt. 3 at Meadow Rd. Rutherford, New Jersey	Sulfation Dustfall	Lead candle Bucket
094	35 Electric Ave. Secaucus, New Jersey	Sulfation	Lead candle
095	294 Central Ave. Union City, New Jersey	Sulfation Dustfall Particulate	Lead candle Bucket High-volume air sampler
096	299 Broad St. Bloomfield, New Jersey	Sulfation	Lead candle
097	485 Passaic Ave. Kearny, New Jersey	Sulfation Dustfall	Lead candle Bucket
098	Bellville Turnpike Kearny, New Jersey	Sulfation Dustfall	Lead candle Bucket
099	Castle Point Station Hoboken, New Jersey	Sulfation	Lead candle
100	So. Center St. & Reock St. Orange, New Jersey	Sulfation Dustfall	Lead candle Bucket
101	7th St. & Newark Ave. Jersey City, New Jersey	Sulfation Dustfall	Lead candle Bucket
102	335 Delancy St. Newark, New Jersey	Sulfation	Lead candle
103	39 Hillside Ave. Hillside, New Jersey	Sulfation	Lead candle

Table 11. (Cont.) AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
104	171 Front St. Elizabeth, New Jersey	Dustfall Sulfation	Bucket Lead candle
105	239 Avenue A Bayonne, New Jersey	Sulfation	Lead candle
106	2020 So. Stiles St. Linden, New Jersey	Sulfation	Lead candle
107	Westfield & Fowler Aves. Rahway, New Jersey	Dustfall Sulfation	Bucket Lead candle
108	339 Roosevelt Ave. Carteret, New Jersey	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
109	Woodbridge Sewage Treatment Plant, Sewaren, N. J.	Dustfall Sulfation	Bucket Lead candle
110	Hwy. #35 & Laurence Pkwy. Laurence Harbor, New Jersey	Sulfation	Lead candle
111	Washington Rd. & Price St. Sayerville, New Jersey	Sulfation	Lead candle
112	Highway #34 Cheesequake, New Jersey	Sulfation	Lead candle
114	87 Nepperhan Ave. Yonkers, New York	Sulfation	Lead candle
115	Samuels Bldg., Steamboat Rd. Kings Point, L. I., N. Y.	Sulfation	Lead candle
116	32nd Ave. - 208th St. Queens, New York	Sulfation	Lead candle
117	Elmont Rd. & Dutch Broadway Elmont, L. I., N. Y.	Sulfation	Lead candle
118	380 W. 33rd St. Manhattan, New York	Sulfation	Lead candle
119	5501 94th St. Queens, New York	Sulfation	Lead candle

Table 11. (Cont.) AIR MONITORING STATIONS

U. S. PUBLIC HEALTH SERVICE

Station Number	Location	Analysis	Technique
120	207 - 01 116th Ave. Queens, New York	Sulfation	Lead candle
121	250 Baltic St. Brooklyn, New York	Sulfation	Lead candle
122	353 Park Place Brooklyn, New York	Sulfation	Lead candle
123	Pennsylvania & Dumont Ave. Brooklyn, New York	Sulfation	Lead candle
124	Bedford Ave. & Ave. H Brooklyn, New York	Sulfation	Lead candle
125	3000 Ave. X at Nostrand Brooklyn, New York	Sulfation	Lead candle
126	1731 Victory Blvd. Staten Island, New York	Sulfation	Lead candle
127	2455 Forest Ave. Staten Island, New York	Sulfation	Lead candle
128	56 Giffords Lane Staten Island, New York	Sulfation	Lead candle
129	1111 Woodrow Road Staten Island, New York	Sulfation	Lead candle
130	7219 Amboy Road Staten Island, New York	Sulfation Particulate	Lead candle High-volume air sampler

WESTCHESTER COUNTY

City of Yonkers

Mr. Richard Paccione, Director
Division of Environmental Health
87 Nepperhan Avenue
Yonkers, New York

At the present time, two stations are maintained in the downtown area. One station, consisting of a high-volume air sampler, a lead peroxide candle, and a dustfall jar, is located at the water filtration plant on the Saw Mill River. The other station, on the roof of the City Health Building, consists of a high-volume air sampler, a lead peroxide candle, a dustfall jar, a Technicon autoanalyzer to continuously monitor for SO_2, and an AISI tape sampler. A wind instrument is currently being installed.

City of New Rochelle

Mr. Arthur H. Klein, Public Health Engineer
30 Church Street
New Rochelle, New York

New Rochelle maintains one continuous monitoring station in the City Health Building, about 40 feet above ground level. Equipment consists of a Technicon SO_2 analyzer, a Beckman CO unit, and a tape sampler. Also included in this station is a wind instrument, a dustfall bucket, one lead candle, and two high-volume air samplers. The CO monitor is calibrated with a standard gas, and the SO_2 monitor is calibrated with a standard sodium metabisulfite solution.

City of White Plains

Mr. C. E. Weber, Senior Engineer
Division of Environmental Sanitation
Martine Avenue
White Plains, New York

Stations are maintained in White Plains, Ossining, Rye, Peekskill, and Somers. Each station is equipped with a high-volume air sampler, a lead candle, and four dustfall collection buckets.

At the White Plains site, monitoring on a 24-hour day, 1-day-a-week basis is to start sometime this year. Pollutants to be monitored are SO_2, NO_2, and oxidants. If this arrangement proves satisfactory, three more stations will be installed by 1968. A wind speed and direction instrument is to be installed in White Plains by July 1967.

City of Mt. Vernon

Mr. Walter M. Scott, Senior Public Health Engineer
City Hall
Mt. Vernon, New York

One station consisting of a dustfall collection bucket, a lead candle, a high-volume air sampler, and a tape sampler is to be installed on the top of City Hall. The analytical work is to be done by the Westchester County Laboratory.

All of the Westchester agencies submit their data to New York State Department of Health, Division of Air Pollution Control, for processing and publication.

The air monitoring activities at Westchester County are summarized in Table 12.

Table 12. AIR MONITORING STATIONS

WESTCHESTER COUNTY

Location	Analysis	Technique
30 Church Street New Rochelle	SO_2 CO_2 Smoke shade Dustfall Sulfation Particulate Wind direction Wind speed	West-Gaeke (Technicon) Infrared (Beckman) Tape sampler Bucket Lead candle High-volume air sampler
White Plains	Dustfall Particulate Sulfation	Bucket High-volume air sampler Lead candle
Ossining	Dustfall Particulate Sulfation	Bucket High-volume air sampler Lead candle
Peekskill	Dustfall Particulate Sulfation	Bucket High-volume air sampler Lead candle
Rye	Dustfall Particulate Sulfation	Bucket High-volume air sampler Lead candle
Somers	Dustfall Sulfation Particulate	Bucket Lead candle High-volume air sampler
87 Nepperhan Avenue Yonkers	SO_2 Dustfall Sulfation	West-Gaeke (Technicon) Bucket Lead candle
Water Filtration Plant Saw Mill River Parkway Yonkers	Dustfall Sulfation	Bucket Lead candle
City Hall Mt. Vernon	Dustfall Sulfation Particulate Smoke shade	Bucket Lead candle High-volume air sampler Tape sampler

COMPILATION OF AIR MONITORING ACTIVITIES

The scope of the overall air monitoring activities in the greater New York area can be shown by maps indicating the locations of the various sampling sites for the major air pollutants. Figure 1 indicates the station locations measuring particulate contaminants; Figure 2, sulfur compounds; Figure 3, other contaminants; and Figure 4, meteorological stations (instruments). Figure 5 indicates the location of all the participating agencies with their respective sampling sites.

Tables 13, 14, and 15 list the locations of the dustfall, suspended particulate, and smoke shade sampling sites, respectively. Table 16 lists the locations of the sulfation sample sites, and Table 17 lists the location and technique of analysis for the sulfur dioxide monitoring stations. Table 18 gives the location of stations monitoring for carbon monoxide; Table 19, for oxides of nitrogen; Table 20, for hydrocarbons; Table 21, for oxidants; and Table 22, for aldehydes.

Figure 1. Particulate measurements in New York metropolitan area.

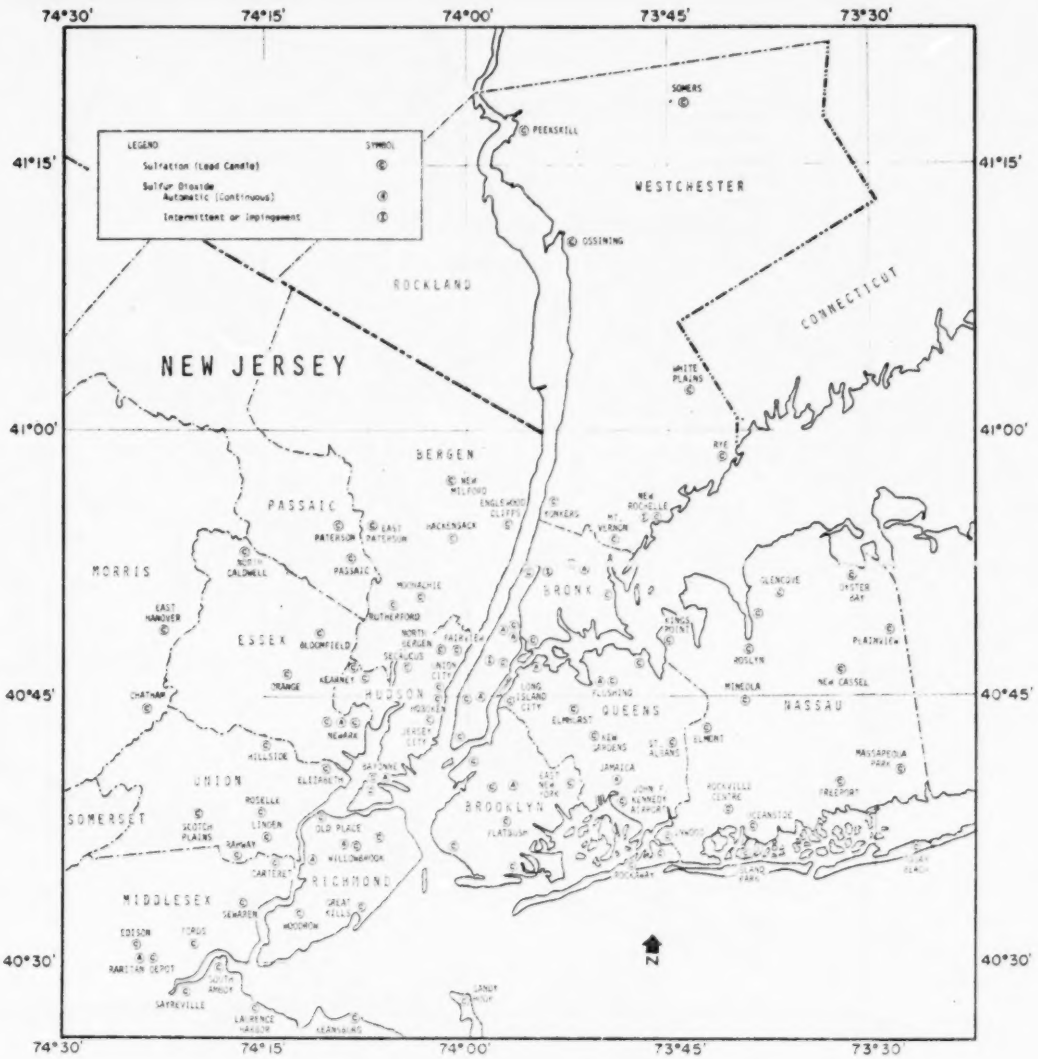

Figure 2. Sulfur compound measurements in New York metropolitan area.

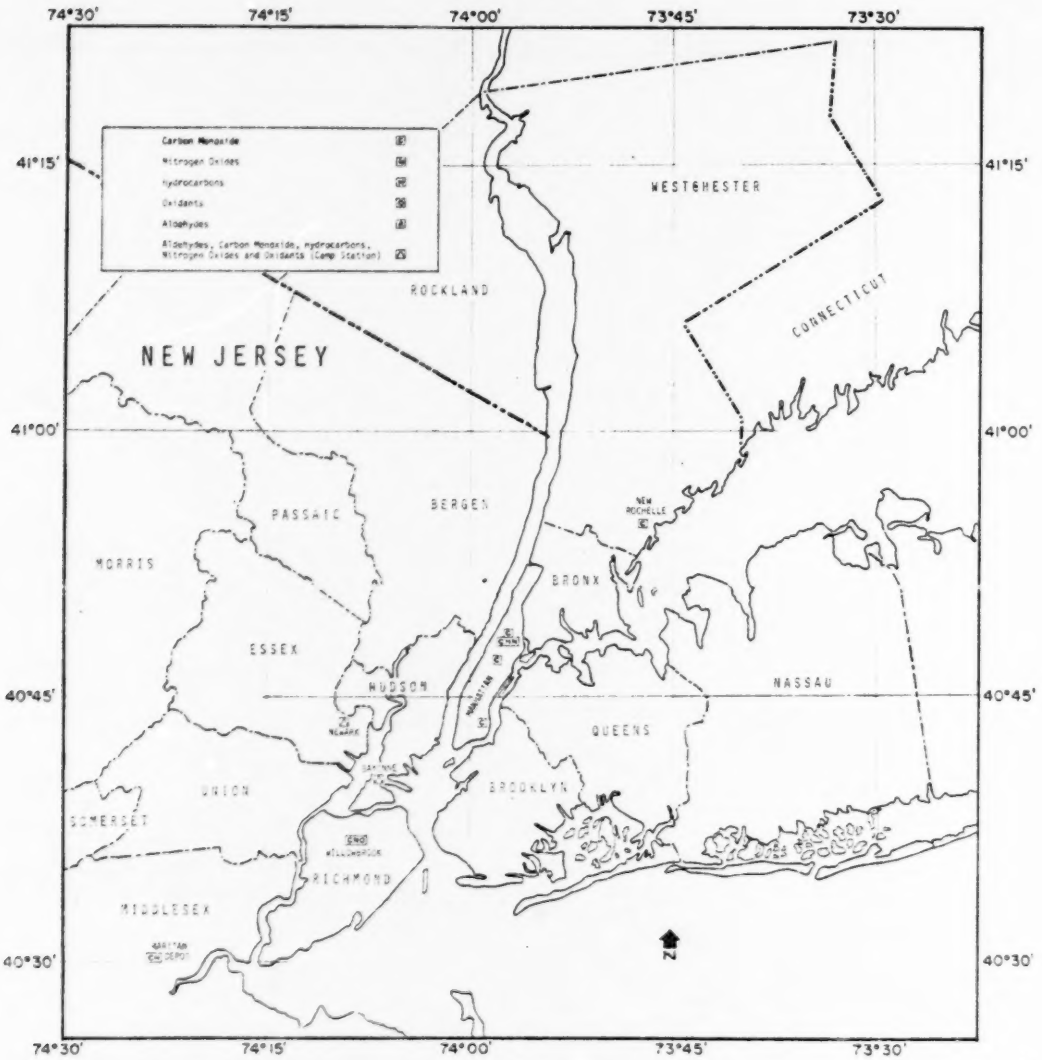

Figure 3. Miscellaneous pollutant measurements in New York metropolitan area.

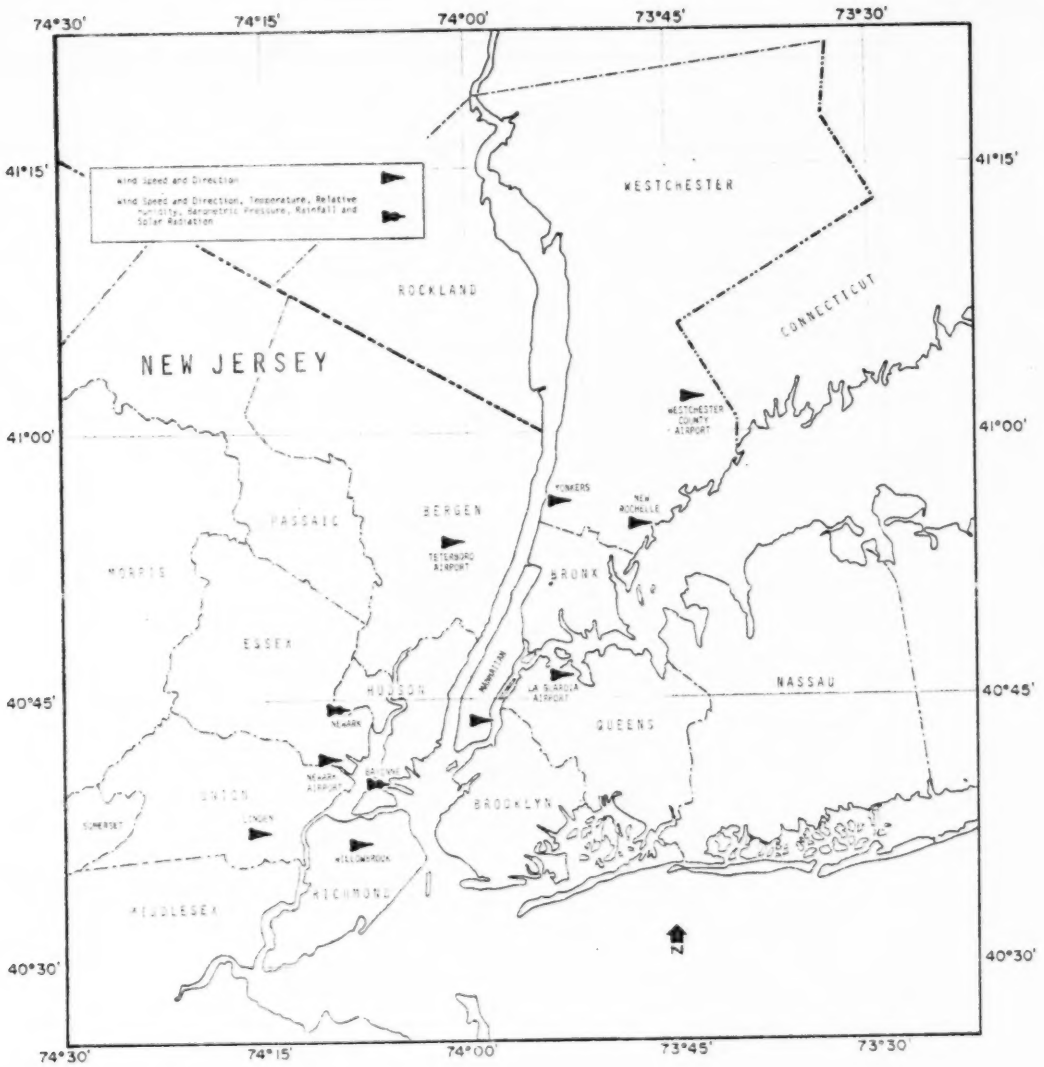

Figure 4. Meteorological measurement stations in New York metropolitan area.

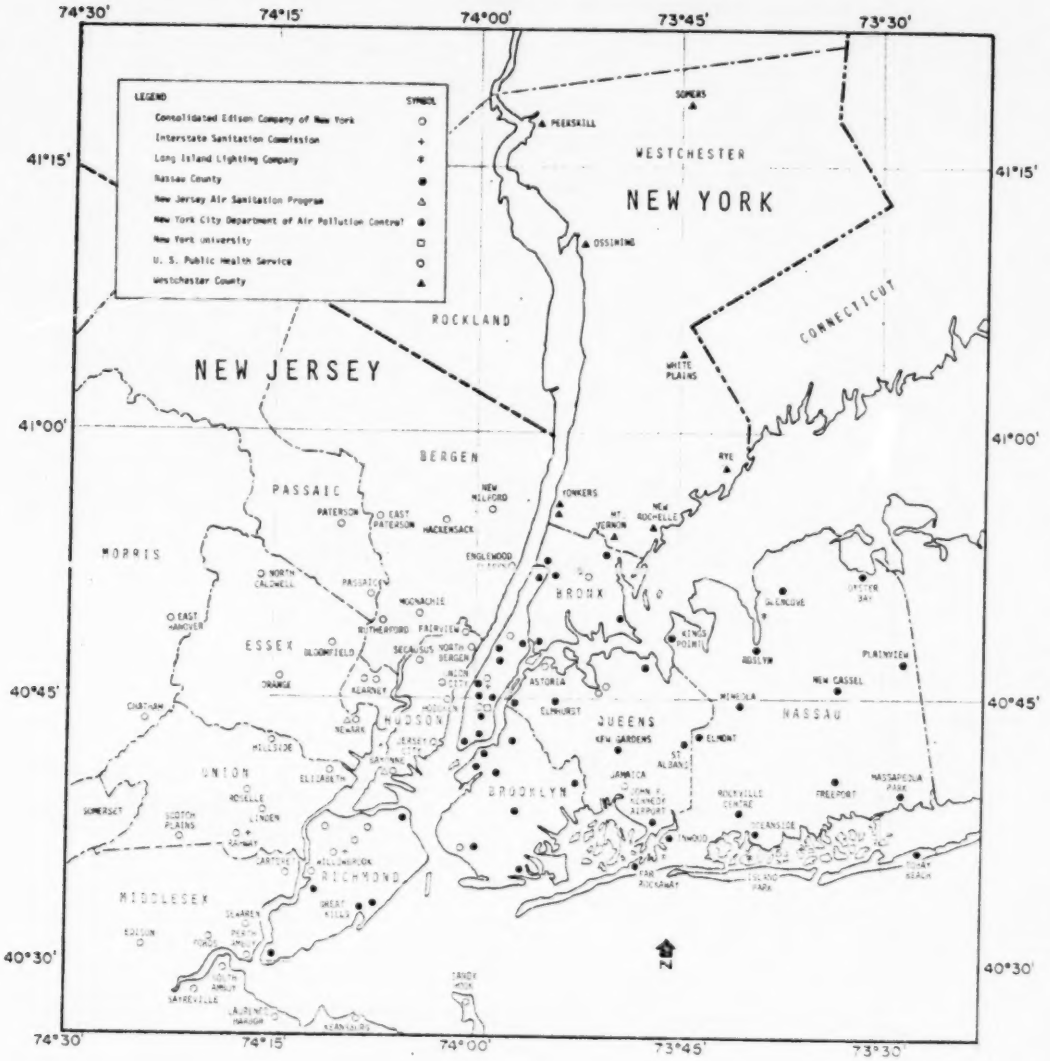

Figure 5. Air monitoring agencies and their sampling stations in New York metropolitan area.

Table 13. DUSTFALL MONITORING STATIONS

Agency	Location
Long Island Lighting Co. (Nassau County Only)	Glenwood Generating Station (Approx. 1 mile north of Roslyn)
	Generating Station Far Rockaway
	Barret Generating Station Island Park
Nassau County	Elmont (Department of Cancer Detection Center)
	Freeport Fire Department
	Glen Cove (Department of Public Works Building)
	Inwood Country Club
	Kings Point (U. S. Merchant Marine Academy)
	Massapequa Fire Department Engine Co. No. 3
	Mineola County Office Bldg.
	New Cassel (Westbury Water District)
	Oceanside Sewage Pumping Station
	Oyster Bay Town Hall
	Plainview (Nassau County Sanatorium)
	Rockville Centre
	Roslyn Water District
	Tobay Beach
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Hwy. Newark, New Jersey
	Hudson County Park Bayonne, New Jersey

Table 13. (Cont.) DUSTFALL MONITORING STATIONS

Agency	Location
New York City Department of Air Pollution Control	51 Astor Place Manhattan, New York
	Central Park (at 79th St.) Manhattan, New York
	10-40-47th Avenue Queens, New York
	445 Southern Blvd. Bronx, New York
	J. F. K. International Airport Queens, New York
	Beach 67th St. & Rockaway Blvd. Queens, New York
	32nd Avenue - 208th Street Queens, New York
	380 West 33rd Street Manhattan, New York
	5501 94th Street Queens, New York
	207-01 116th Street Queens, New York
	250 Baltic Street Brooklyn, New York
	353 Park Place Brooklyn, New York
	Pennsylvania & Dumont Ave. Brooklyn, New York
	Bedford Avenue & Avenue H Brooklyn, New York
	3000 Avenue X (at Nostrand) Brooklyn, New York
	56 Giffords Lane Staten Island, New York
	7219 Amboy Road Staten Island, New York

Table 13. (Cont.) DUSTFALL MONITORING STATIONS

Agency	Location
New York City Department of Air Pollution Control	Central Ave. & Slossen Terrace Staten Island, New York
	170 East 121st Street Manhattan, New York
	1601 80th Street Brooklyn, New York
	Kingsbridge Ave. & 323nd St. Bronx, New York
	3750 Baychester Ave. Bronx, New York
	151 Maujer Street Brooklyn, New York
	32 East Broadway Manhattan, New York
	2275 Hylan Blvd. Staten Island, New York
	Sanitary Landfill No. 1 Muldoon Ave. (off Fresh Kill Rd.) Staten Island, New York
	515 W. 102nd St. & Amsterdam Ave. Manhattan, New York
	Waring & Bronxwood Aves. Bronx, New York
	Logan & Edison Aves. Bronx, New York
	Union Turnpike and Queens Blvd. Queens, New York
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York
	Chestnut St. & First St. Roselle, New Jersey
	Bergen Ave. & Fairview St. Fairview, New Jersey

Table 13. (Cont.) DUSTFALL MONITORING STATIONS

Agency	Location
U. S. Public Health Service	J. F. K. Airport-Bldg. 141 Queens, New York
	Raritan Depot Metuchen, New Jersey
	Hudson County Park Bayonne, New Jersey
	Raymond Blvd. & McCarter Hwy. Newark, New Jersey
	Victory Bridge Plaza So. Amboy, New Jersey
	Rt. 22 & Myrtle Ave. Scotch Plains, New Jersey
	400 Ridgedale Ave. East Hanover, New Jersey
	Boumar Place East Paterson, New Jersey
	7400 Westside Ave. No. Bergen, New Jersey
	Rt. 3 at Meadow Rd. Rutherford, New Jersey
	294 Central Ave. Union City, New Jersey
	485 Passaic Ave. Kearny, New Jersey
	Bellville Turnpike Kearny, New Jersey
	So. Center St. & Reock St. Orange, New Jersey
	7th St. & Newark Ave. Jersey City, New Jersey
	171 Front Street Elizabeth, New Jersey

Table 13. (Cont.) DUSTFALL MONITORING STATIONS

Agency	Location
U. S. Public Health Service	Westfield & Fowler Aves. Rahway, New Jersey
	339 Roosevelt Ave. Carteret, New Jersey
	Woodbridge Sewage Treatment Plant Cliff Rd., Sewaren, New Jersey
Westchester County	30 Church St. New Rochelle
	White Plains
	Ossining
	Peekskill
	Rye
	Somers
	87 Nepperhan Ave. Yonkers
	Water Filtration Plant Saw Mill River Parkway Yonkers
	City Hall Mt. Vernon

Table 14. SUSPENDED PARTICULATE MONITORING STATIONS

Agency	Location
Nassau County	Freeport Fire Department
	Glen Cove (Dept. of Public Works Bldg.)
	Inwood Country Club
	Kings Point (U. S. Merchant Marine Academy)
	Massapequa Fire Department Engine Co. No. 3
	Mineola County Office Bldg.
	New Cassel (Westbury Water District)
	Plainview (Nassau County Sanatorium)
	Rockville Centre
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Hwy.[a] Newark, New Jersey
	Hudson County Park Bayonne, New Jersey
New York City Department of Air Pollution Control	17 Battery Place Manhattan, New York
	57th St. & 15th Ave. Manhattan, New York
	57th St. & Second Ave. Manhattan, New York
	7219 Amboy Road Staten Island, New York
	170 East 121st Street Manhattan, New York
U. S. Public Health Service	2760 Victory Blvd.[a] Staten Island, New York
	Raritan Depot Metuchen, New Jersey

[a]Respirable Particulate - Aerotec Respirable Sampler

Table 14. (Cont.) SUSPENDED PARTICULATE MONITORING STATIONS

Agency	Location
U. S. Public Health Service	294 Central Ave. Union City, New Jersey
	339 Roosevelt Ave. Carteret, New Jersey
	7219 Amboy Rd. Staten Island, New York
Westchester County	30 Church St. New Rochelle
	White Plains
	Ossining
	Peekskill
	Rye
	Somers
	City Hall Mt. Vernon

Table 15. SMOKE SHADE MONITORING STATIONS

Agency	Location
Consolidated Edison Company of New York	4 Irving Place Manhattan, New York
	32 West 125 Street Manhattan, New York
	41-82 Main Street Queens, New York
Interstate Sanitation Commission	2760 Victory Blvd Staten Island, New York
	Rahway Sewage Treatment Plant Rahway, New Jersey
	10 Columbus Circle Manhattan, New York
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Hwy. Newark, New Jersey
	Hudson County Park Bayonne, New Jersey
New York City Department of Air Pollution Control	51 Astor Place Manhattan, New York
	Central Park (at 79th St.) Manhattan, New York
	1911 Osborne Place Bronx, New York
	17 Battery Place Bronx, New York
	57th St. & 15th Ave. Manhattan, New York
	10-40-47th Ave. Queens, New York
	445 Southern Blvd. Bronx, New York
	333 Jay Street Brooklyn, New York
	57th St. & Second Ave. Manhattan, New York
	170 East 121st Street Manhattan, New York
Westchester County	30 Church St. New Rochelle
	City Hall Mt. Vernon

Table 16. SULFATION MONITORING STATIONS

Agency	Location
Long Island Lighting Company	Glenwood Generating Station (Approx. 1 mile north of Roslyn)
	Generating Station Far Rockaway
	Barret Generating Station Island Park
Nassau County	Elmont (Dept. of Cancer Detection Center)
	Freeport Fire Department
	Glen Cove (Dept. of Public Works Bldg.)
	Inwood Country Club
	Kings Point (U. S. Merchant Marine Academy)
	Massapequa Fire Department Engine Co. No. 3
	Mineola County Office Bldg.
	New Cassel (Westbury Water District)
	Oceanside Sewage Pumping Station
	Oyster Bay Town Hall
	Plainview (Nassau County Sanatorium)
	Rockville Centre
	Roslyn Water District
	Tobay Beach
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Hwy. Newark, New Jersey
	Hudson County Park Bayonne, New Jersey
New York City Department of Air Pollution Control	Central Park (at 79th St.) Manhattan, New York

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
New York City Department of Air Pollution Control	17 Battery Place Manhattan, New York
	10-40-47th Avenue Queens, New York
	445 Southern Blvd. Bronx, New York
	Waring & Bronxwood Aves. Bronx, New York
	Logan & Edison Aves. Bronx, New York
	Union Turnpike & Queens Blvd. Queens, New York
	J. F. K. International Airport Queens, New York
	Beach 67th St. & Rockaway Blvd. Queens, New York
	32nd Aveune - 208th St. Queens, New York
	380 West 33rd St. Manhattan, New York
	5501 94th St. Queens, New York
	207 - 01 116th St. Queens, New York
	250 Baltic St. Brooklyn, New York
	353 Park Place Brooklyn, New York
	Pennsylvania & Dumont Ave. Brooklyn, New York
	Bedford Ave. & Ave. H Brooklyn, New York

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
New York City Department of Air Pollution Control	3000 Ave. X (at Nostrand) Brooklyn, New York
	56 Giffords Lane Staten Island, New York
	7219 Amboy Road Staten Island, New York
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York
	Chestnut St. & First St. Roselle, New Jersey
	Bergen Ave. & Fairview St. Fairview, New Jersey
	Fort Hamilton Brooklyn, New York
	Raritan Depot Metuchen, New Jersey
	Hudson County Park Bayonne, New Jersey
	Raymond Blvd. & McCarter Hwy. Newark, New Jersey
	Central Park at 79th St. Manhattan, New York
	30 Church St. New Rochelle, New York
	445 Southern Blvd. Bronx, New York
	17 Battery Place Manhattan, New York
	10-42 47th Ave. Queens, New York
	170 E. 121st St. Manhattan, New York

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
U. S. Public Health Service	101 Passaic Ave. Passaic, New Jersey
	515 W. 182nd St. & Amsterdam Ave. Manhattan, New York
	Waring & Bronxwood Aves. Bronx, New York
	Logan & Edison Aves. Bronx, New York
	Union St. & Northern Blvd. Queens, New York
	Union Turnpike & Queens Blvd. Queens, New York
	J. F. K. Airport - Bldg. 141 Queens, New York
	Beach 67th St. & Rockaway Blvd. Queens, New York
	Ft. Hancock Highlands, New Jersey
	Highland Ave. & Beach Way Keansburg, New Jersey
	Victory Bridge Plaza So. Amboy, New Jersey
	King George Road Fords, New Jersey
	Stephenville Pky. & Park Ave. Edison, New Jersey
	Rt. 22 & Myrtle Ave. Scotch Plains, New Jersey
	12 South Passaic St. Chatham, New Jersey
	400 Ridgedale Ave. East Hanover, New Jersey

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
U. S. Public Health Service	West Essex High School North Caldwell, New Jersey
	157 Gould Ave. Paterson, New Jersey
	Boumar Place East Paterson, New Jersey
	111 Midtown Hackensack, New Jersey
	Rt. 9W & Van Nostrand Ave. Englewood Cliff, New Jersey
	Rye Police Headquarters Rye, New York
	Glen Cove Public Works Bldg. Glen Cove, New York
	407 Henley Ave. New Milford, New Jersey
	111 Moonachie Road Moonachie, New Jersey
	7400 Westside Ave. No. Bergen, New Jersey
	Rt. 3 at Meadow Rd. Rutherford, New Jersey
	35 Electric Ave. Secaucus, New Jersey
	294 Central Ave. Union City, New Jersey
	299 Broad St. Bloomfield, New Jersey
	485 Passaic Ave. Kearny, New Jersey
	Bellville Turnpike Kearny, New Jersey
	Castle Point Station Hoboken, New Jersey

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
U. S. Public Health Service	So. Center St. & Reock St. Orange, New Jersey
	7th St. & Newark Ave. Jersey City, New Jersey
	335 Delancy St. Newark, New Jersey
	29 Hillside Ave. Hillside, New Jersey
	171 Front St. Elizabeth, New Jersey
	239 Avenue A Bayonne, New Jersey
	2020 So. Stiles St. Linden, New Jersey
	Westfield & Fowler Aves. Rahway, New Jersey
	339 Roosevelt Ave. Carteret, New Jersey
	Woodbridge Sewage Treatment Plant Cliff Road Sewaren, New Jersey
	Hwy. #35 & Laurence Pkwy. Laurence Harbor, New Jersey
	Washington Rd. & Price St. Sayerville, New Jersey
	Highway #34 Cheesequake, New Jersey
	87 Nepperhan Ave. Yonkers, New York
	Samuels Bldg., Steamboat Rd. Kings Point, L. I., N. Y.
	32nd Ave. - 208th St. Queens, New York

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
U. S. Public Health Service	Elmont Rd. & Dutch Broadway Elmont, L. I., N. Y.
	380 W. 33rd St. Manhattan, New York
	5501 94th St. Queens, New York
	207 - 01 116th Ave. Queens, New York
	250 Baltic St. Brooklyn, New York
	353 Park Place Brooklyn, New York
	Pennsylvania & Dumont Ave. Brooklyn, New York
	Bedford Ave. & Ave. H Brooklyn, New York
	3000 Ave. X at Nostrand Brooklyn, New York
	1731 Victory Blvd. Staten Island, New York
	2455 Forest Ave. Staten Island, New York
	56 Giffords Lane Staten Island, New York
	1111 Woodrow Rd. Staten Island, New York
	7219 Amboy Rd. Staten Island, New York
Westchester County	30 Church St. New Rochelle
	White Plains

Table 16. (Cont.) SULFATION MONITORING STATIONS

Agency	Location
Westchester County	Ossining
	Peekskill
	Rye
	Somers
	87 Nepperhan Ave. Yonkers
	Water Filtration Plant Saw Mill River Parkway Yonkers
	City Hall Mt. Vernon

Table 17. SULFUR DIOXIDE MONITORING STATIONS

Agency	Location	Technique
Consolidated Edison Company of New York	4 Irving Place Manhattan, New York	Conductivity (Davis)
	32 West 125 Street Manhattan, New York	Conductivity (Davis)
	128 West End Avenue Manhattan, New York	Conductivity (Davis)
	1610 Matthews Ave. Bronx, New York	Conductivity (Davis)
	Astoria Generating Station Queens, New York	Conductivity (Davis)
	41-82 Main St. Queens, New York	Conductivity (Davis)
	90-22 161 St. Queens, New York	Conductivity (Davis)
	1610 Pitkin Ave. Brooklyn, New York	Conductivity (Davis)
	Arthur Kill Generating Station Staten Island, New York	Conductivity (Davis)
Interstate Sanitation Commission	2760 Victory Blvd. Staten Island, New York	Titrimetric (Seq.)
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	West-Gaeke (Technicon)
	Hudson County Park Bayonne, New Jersey	West-Gaeke (Technicon)
New York City Department of Air Pollution Control	57th St. & 2nd Ave. New York, New York	Titrimetric (Seq.)
	10-40 47th Ave. Queens, New York	Titrimetric (Seq.)
	33 Jay St. Brooklyn, New York	Titrimetric (Seq.)

Table 17. (Cont,) SULFUR DIOXIDE MONITORING STATIONS

Agency	Location	Technique
New York City Department of Air Pollution Control	17 Battery Place Manhattan, New York	Titrimetric (Seq.)
	Samuel Gompers H. S. Bronx, New York	Titrimetric (Seq.)
New York University	Ave. B & East 8th St. Manhattan, New York	Conductivity (Davis) West-Gaeke (Technicon)
Westchester County City of Yonkers	87 Nepperhan Ave.	West-Gaeke (Technicon)
City of New Rochelle	30 Church St.	West-Gaeke (Technicon)
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York	Conductivity (Beckman)
	Raritan Depot Metuchen, New Jersey	Conductivity (Davis)

Table 18. CARBON MONOXIDE MONITORING STATIONS

Agency	Location	Technique
Consolidated Edison Company of New York	4 Irving Place Manhattan, New York	Infrared
	32 West 125 Street Manhattan, New York	Infrared
	41-82 Main Street Queens, New York	Infrared
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	Infrared
New York City Department of Air Pollution Control	51 Astor Place Manhattan, New York	Infrared
	170 East 121st Street Manhattan, New York	Infrared (MSA)
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York	Infrared
	Raritan Depot Metuchen, New Jersey	Infrared
Westchester County	30 Church Street New Rochelle	Infrared (Beckman)

Table 19. OXIDES OF NITROGEN MONITORING STATIONS

Agency	Location	Technique
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	Saltzman (Technicon)
	Hudson County Park Bayonne, New Jersey	Saltzman (Technicon)
New York City Department of Air Pollution Control	17 Battery Place Manhattan, New York	Saltzman (Technicon)
	57th St. & Second Ave. Manhattan, New York	Saltzman (Technicon)
	170 East 121st Street Manhattan, New York	Saltzman (Technicon)
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York	Saltzman (Technicon)

Table 20. HYDROCARBON MONITORING STATIONS

Agency	Location	Technique
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	Flame ionization
	Hudson County Park Bayonne, New Jersey	Flame ionization (Davis)
New York City Department of Air Pollution Control	170 East 121st Street Manhattan, New York	Flame ionization
U. S. Public Health Service	Raritan Depot Metuchen, New Jersey	Flame ionization

Table 21. OXIDANT MONITORING STATIONS

Agency	Location	Technique
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	KI (Technicon)
	Hudson County Park Bayonne, New Jersey	KI (Technicon)
U. S. Public Health Service	2760 Victory Blvd. Staten Island, New York	KI (Technicon)

Table 22. ALDEHYDE MONITORING STATIONS

Agency	Location	Technique
New Jersey Air Sanitation Program	Raymond Blvd. & McCarter Highway Newark, New Jersey	Schiff (Technicon)
	Hudson County Park Bayonne, New Jersey	Schiff (Technicon)

CONCLUSIONS

As might be expected, the various agencies engaged in air monitoring activities in the greater New York area sometimes use different techniques and methods for determining air contaminants. This situation is not unique to the New York area. Because air monitoring technology is still in the process of development, changes in both techniques and methods are constantly occuring. No one particular method has been adopted as a standard method at the exclusion of others.

The survey revealed that most pollutants were being determined by the same or a slightly modified method. The major exception is sulfur dioxide. Groups that measure sulfur dioxide continuously but not automatically use the hydrogen peroxide method. Agencies employing continuous automatic monitoring use either the conductivity or West-Gaeke method.

Comparison of results obtained by the groups monitoring for SO_2 in the New York area has indicated discrepancies in the values obtained by the three methods. The differences in values are believed to be due to interferences from other air pollutants that can affect one method and not the others. Existing data show that comparative results on occasions may differ by as much as 0.1 ppm. Continual work by research groups is needed to resolve these differences before confident statements can be made about the absolute accuracy of SO_2 levels as determined by the three methods. In spite of the disparity in measurement values, a well-maintained, continuous monitoring program is capable of providing meaningful information on the air quality in the New York area.

* U.S. GOVERNMENT PRINTING OFFICE : 1969 O - 354-731